(12) UK Patent Application (19) GB (11) 2 352 128 (13) A

(43) Date of A Publication 17.01.2001

(54) Abstract Title
Location alerting within cellular networks

(57)   A mobile phone stores location area identities corresponding to identities of base stations which can be received by the mobile at a selected location. The location area identities of base station transmissions received in a current location are compared with the stored location identities, and an alert signal is generated when the stored location area identity matches the currently received area identity, or an alert signal is generated when there is no longer a match. The mobile phone may generate an alarm to alert a traveller (eg. a commuter on a train or coach) on arrival at, and/or departure from, a selected location. The user may use menus 3, 6 to select from a plurality of preset locations, or to enter a new location. Other menus 7, 8 allow selection between generation of the alert with no time limitation, or only after a certain time of day, or only after a certain delay time, and selection between activation of the alarm only, or alarm plus other action, or the other action only. Such other action may be selected as sending of a voice message, an SMS signal (eg. to request preparation of dinner, or to be met at a train station), a request for data (such as maps or local information from the internet), or sending of an e-mail.
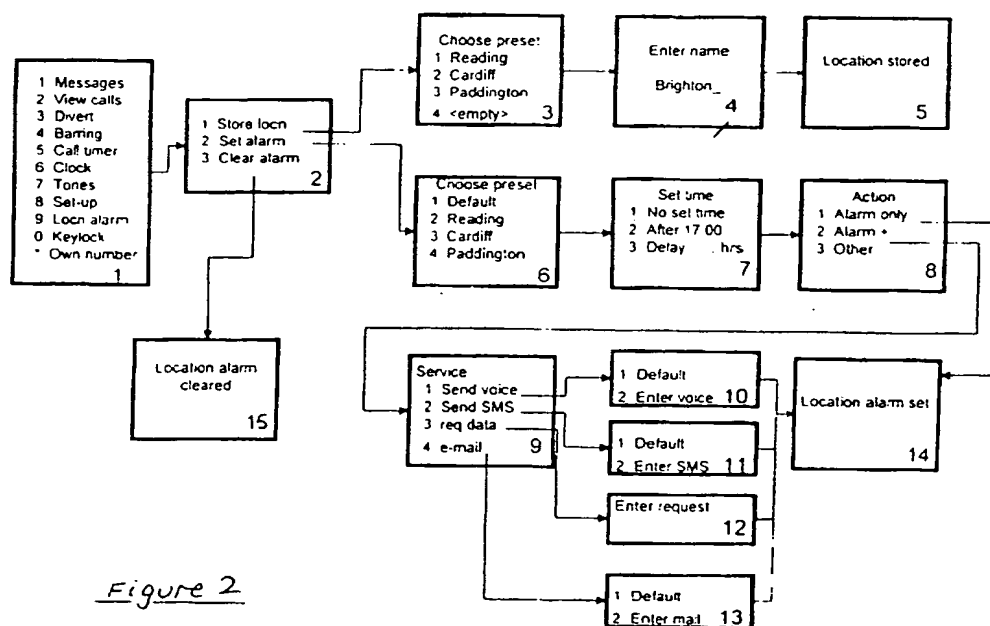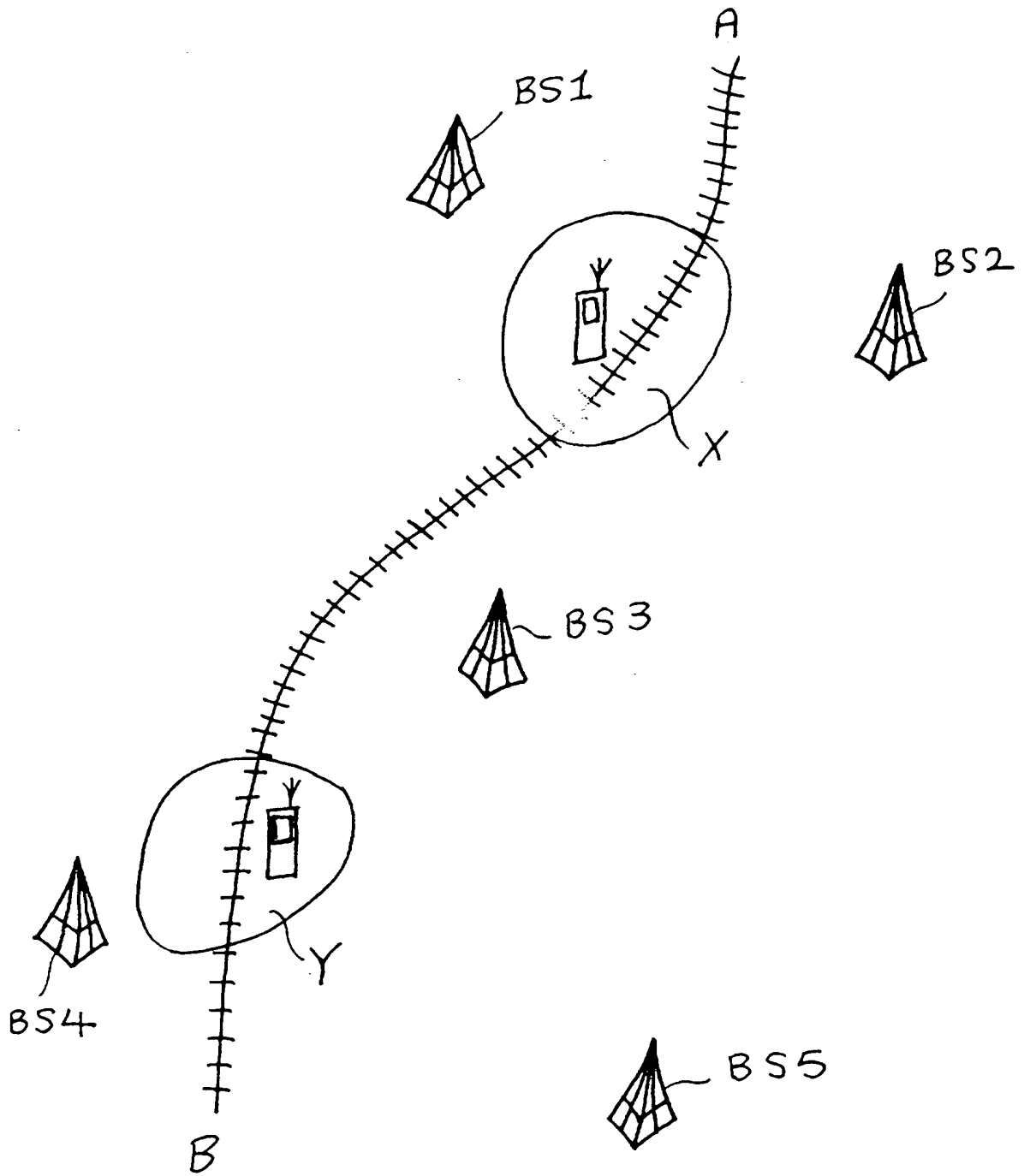
Figure 2

GB 2 352 128 A

A

BS1

BS2

X

BS3

Y

BS4

B

BS5

Figure 1

Figure 2

1
1 Messages
2 View calls
3 Divert
4 Barring
5 Call timer
6 Clock
7 Tones
8 Set-up
9 Locn alarm
0 Keylock
• Own number

2
1 Store locn
2 Set alarm
3 Clear alarm

15
Location alarm cleared

3
Choose preset
1 Reading
2 Cardiff
3 Paddington
4 <empty>

6
Choose preset
1 Default
2 Reading
3 Cardiff
4 Paddington

9
Service
1 Send voice
2 Send SMS
3 req data
4 e-mail

4
Enter name

Brighton_

7
Set time
1 No set time
2 After 17:00
3 Delay ......hrs

10
1 Default
2 Enter voice

11
1 Default
2 Enter SMS

12
Enter request

13
1 Default
2 Enter mail

5
Location stored

8
Action
1 Alarm only
2 Alarm +
3 Other

14
Location alarm set

ID=RG-E

ID=RG-C
Location Y

ID=RG-A

ID=RG-F

ID=RG-D

Location X

Point P

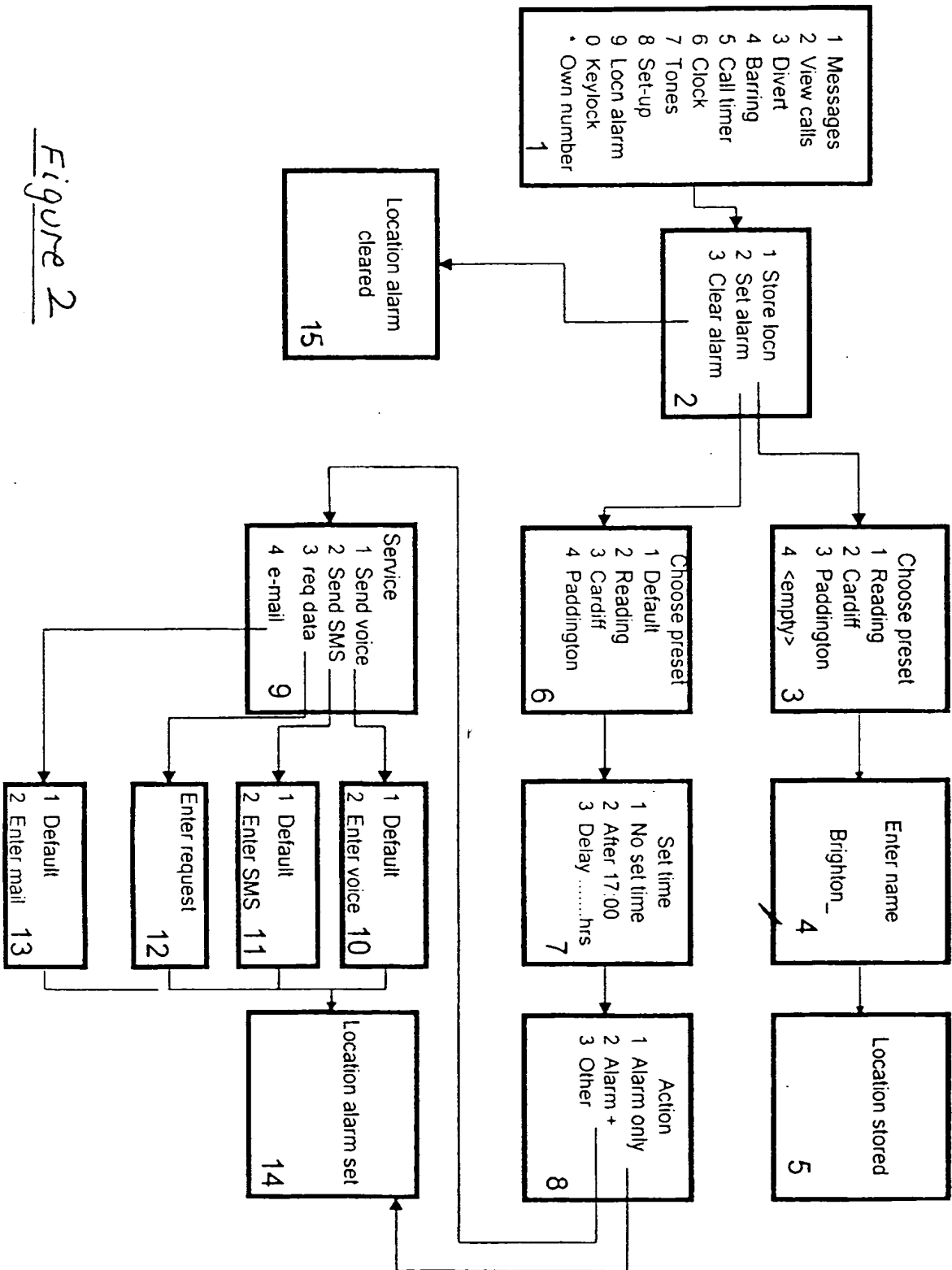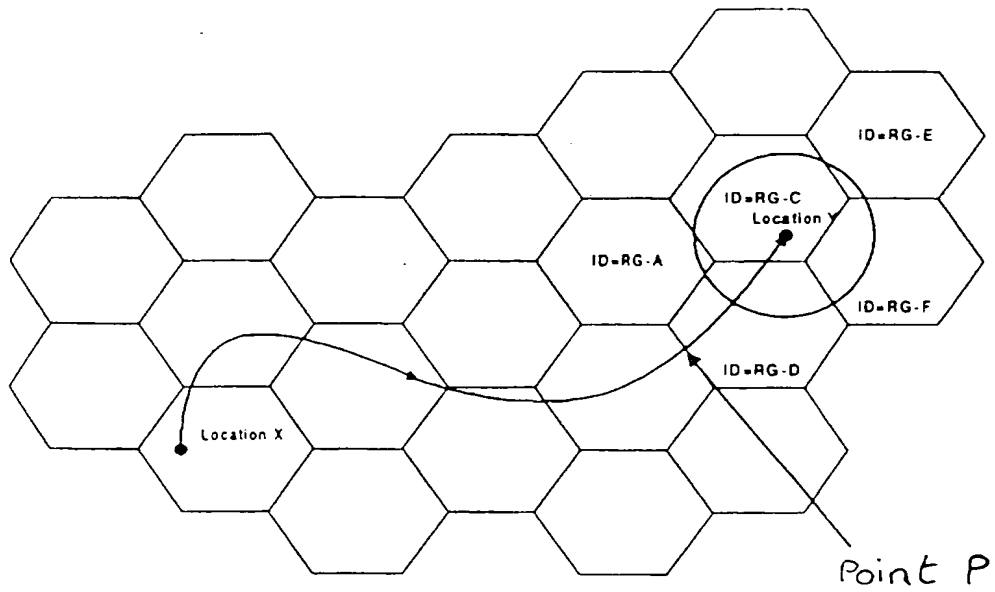Figure 3

\

Location alerting within cellular networks

This invention relates to location alerting within cellular networks and it has particular application to personal alarms for mobile phones.

Location warning systems are known in the prior art as in e.g. US 5 790 973 to Blaker et al in which a warning system automatically alerts the driver of a vehicle on arrival at a last access point for fuel or rest. The Blaker patent requires a specialized fit of equipment to achieve accurate positioning data. The updating of internet access points on the basis of system information broadcast by networks is the subject of WO 99/16263 by Tarnanen which describes, *inter alia*, the short message service (SMS). Location updating from one mobile cellular radiophone system such as GSM (Global System for Mobile communications, formerly Groupe Special Mobile) to another cellular radiophone system such as DECT (Digital European Cordless Telecommunications) is also taught in US 5 384 824 to Alvesalo.

The Alvesalo patent provides for updating of the networks following a change in the subscriber's location as detected by the mobile station from a change in the location area identities of the base stations. Updating of the networks, as taught, does not involve the subscriber nor does it provide additional services for the user of the mobile station.

It is an object of the present invention to provide additional features for a mobile station by using the location information available in network transmissions.

According to the invention there is provided a communications receiver in which characteristics of radio signals broadcast in selected locations by transmitters of cellular networks are stored and compared with the characteristics of radio signals received in the current location of said receiver and in which an alerting signal is generated in response to a match between said received characteristics in the current location and said stored characteristics of a selected location.

An alarm incorporated within a mobile phone to alert train or coach travellers at a pre-determined stage of their journey would be a valuable addition to the utility of a mobile phone. The setting of an alarm to operate at a future time expected to be coincident with a particular stage of the journey is an obvious solution. Owing to the unpredictable delays often encountered by the traveller, however, such a simple elapsed time indication would, as often as not, be insufficient. Additionally some complications could arise when the traveller moved into and out of different time zones.

One example of the invention will now be described with reference to the figures in which

Figure 1 illustrates a train journey of a traveller with a mobile phone,

figure 2 is a flow chart illustrating the setting of an alert,

figure 3 is a schematic diagram of a journey within a cellular network.

With reference to figure 1, consider a mobile phone user travelling by train from A to B through locations X, and Y. When located within the area X, the user's phone will receive the broadcasts from each of the cellular base stations BS1, BS2, and BS3. The signals broadcast by BS1 contain characteristics identifying BS1 uniquely e.g. an international Location Area Identity. Similarly the transmissions from BS2, and BS3 , will be uniquely identifiable from characteristics included in their transmissions.

When the user has moved from location X to location Y, the broadcasts received by the phone at location Y will have originated from base stations BS3, BS4 and BS5, each of which has a unique identification code. Identification of the broadcasts received by the phone will therefore allow discrimination at the mobile station between locations X and Y.

A current location may be stored for use as a selected location and an alert instruction implemented. With reference to figure 1, a commuting traveller beginning a journey at B and travelling to A, later to return to B could enter location Y into a mobile phone as a selected location when passing through location Y a short time after starting the journey. At the start of the return journey from A to B, location Y would then be selected for an alert as described below.

With the phone set in the alert mode, a periodic check of the location area identity of all base stations " visible" to the phone will commence. A base station will be regarded as visible to the mobile station if its broadcasts are

received by the mobile station. In some cases the mobile station will receive broadcasts from networks to which it does not have authorised access. These broadcasts will carry location characteristics, however and will be visible to the mobile station. An option to delay the start of periodic search or to search only during certain times can be presented to the user. A regular commuter could, by this means be alerted only on a homeward journey.

In the GSM system the base station identities will be contained in the BCCH (Broadcast Control CHannel) broadcasts. The location area identities obtained during each periodic check of current location will be compared with the Location area identities of the selected location. When a match occurs between current and selected locations a signal is generated. Amongst other characteristics, mobile phone local dialing codes may be used as location identities.

The location match signal will then trigger the actions previously selected by the user. An alarm may be given. The type of alarm for the traveller may be selected as a jingle, a vibration, a voice message etc. The location match signal may also initiate automatically the sending of a pre-stored SMS message to request e.g. preparation of dinner or to be met at the train station.

The location match signal may also be used to generate a request to pull data from an open data network such as internet e.g. for maps and /or local information. Alternatively a request may be generated for data to be pushed from an open network.

Known characteristics of base station area messages can be entered and stored at any location so as to avoid the need for a previous visit to the site of selected locations. With reference to the schematic diagram of figure 3, the area messages in a particular locality may for example have a common prefix such that five base stations send RG-A, RG-B, RG-C, RG-D and RD-E respectively. This location information may be entered and furthermore may be truncated to RG* such that the pattern match RG* will initiate an alert when any of the five base stations RG-A through RG-E are visible.

A journey from location X to location Y in a cellular system is illustrated in figure 3. The hexagons of figure 3 represent cells within the cellular system where each of the cells is served by a base station communicating with mobile stations within that cell. A mobile station set for an alert on receipt of a location identity RG* and approaching location Y along the locus shown will be alerted when passing through the point P. Passage through point P will bring the mobile into the cell in which it will receive broadcasts from the base station RG-D.

There exists presently in most mobile phones a so-called address book feature. A list of names is stored and for each name a corresponding phone number is also stored. Menu selection of a name from the list of names will initiate a call to the number corresponding to the selected name. A slight variation of the address book feature allows a list of location names to correspond to a list of base stations visible in the named locations. A menu is presented to the user via the usual VDU user interface of a mobile phone.

The process of menu selection is illustrated in figure 2. The "locn alarm" legend (location alarm) is added to the main menu 1. Selection of locn alarm prompts sub menu 2 from which the features "store locn" (store location), "set alarm" or "clear alarm" can be chosen. Selection of "store locn" prompts sub menu 3 which presents the names, assigned by the user, of previously stored locations. A selection from menu 3 will prompt sub menu 4. In the example shown in figure 2, the three locations stored as Reading, Cardiff and Paddington are to be retained and a further location is to be stored as Brighton. An empty store is selected at 3 and polling of the visible base stations is initiated. The name entered by the user in sub menu 4 corresponds to the location currently being stored. Completion of the process of storage of the visible base stations' identities corresponding to Brighton is indicated by the presentation of the display 5.

To set an alarm, "set alarm" is selected from the display 2 and the required alarm location from the subsequent display 6. A selection from display 6 prompts display 7 in which the timing of the alerting signal can be set. The choice of "no set time" from display 7 will cause the alerting signal to operate on entry of the phone to the location previously set in display 6.

Selection of the second item in display 7, "after (:)", prompts entry of a time of day e.g. (17:00) after which time the alerting signal will be activated by entry of the phone into a selected location. If a time of day is entered for the second item a prompt will be given for an entry in the " Delay (.....) hrs item in display 7. The alerting signal will remain enabled for the length of time after 17:00 entered in the Delay (....) hrs selection. Where no time of

day setting is entered for the second selection of display 7, the alerting signal will remain disabled for the duration of the delay time entered.

Display 7 is followed by display 8, which offers the Action menu. Selection of the first item "alarm only" prompts the "location alarm set" display 14 to confirm that operation of the alarm will proceed in accordance with the previous menu selections. The second and third items of the action menu 8, if selected, will prompt the service menu of display 9. The "alarm +" selection in display 8 provides for an alarm, when a selected location is entered, together with initiation of a voice or SMS message or a request for data. Selection of the third item "other" in display 8 will provide for initiation of the services selected in display 9 *et. seq.* but without an accompanying alarm to the user.

A "send voice" selection from menu 9 prompts display 10 to present the menu choice of "Default" or "Enter voice". The "Default" selection provides for a previously stored voice message to be transmitted on arrival at a selected location otherwise a new voice message for transmission may be entered and stored in the phone. Similarly in sub menu 11 which follows a "Send SMS" selection in 9 a previously stored message may be re-employed or substituted with a fresh message.

The third option "req data" presented in display 9 is for a request for data from an open network and the request is entered subsequently at 12. The request for data may be to pull data from the network or may be a push data request. A push data request would be particularly suitable as a request for

supply of information specific to the new location. The information would then be pushed from the open network as the traveller is arriving in the new location and subsequently. A further request to cancel the location specific pushed data may be generated when the traveller leaves the selected location. Departure from the selected location will be evident from the mismatch between the characteristics of the received radio signals and the stored characteristics.

More generally the invention may be extended to include a communications receiver in which characteristics of radio signals broadcast in selected locations by transmitters of cellular networks are stored and compared with matching characteristics of radio signals received in the current location of said receiver and in which an alerting signal is generated when said received characteristics in the current location no longer match said stored characteristics of a selected location.

By this means an alerting signal is generated when a communications receiver leaves a selected location. The selected location may be the current location. This facility is likely to prove useful when it is necessary for a third party to have some knowledge of the whereabouts of a particular person or group of people. An alerting signal generated in response to departure from a selected area may be used to generate a voice message, SMS message, electronic mail, a request for data or a request to cancel or withhold data. Data supplied in respect of a particular locality would not normally be of use outside that locality and could be withheld pending a return visit by the receiver.

Further sub menus (not shown) resulting from selections in **10, 11, 12** and **13** may be used to facilitate storage of the voice, SMS, electronic mail , request for data or request to cancel data. Another sub menu between **10** through **13** and **14** may be used to select " entry", "exit" or "entry and exit" to provide an alerting signal only on entry to a selected location, only on departure from a selected location or on both entry and departure.

Correct setting of the alarm and /or other services is displayed in **14**. A "clear alarm" selection is presented in menu **2** and a confirmation of location alarm cleared is presented at **15**. When the alarm is cleared by means of the "clear alarm" selection of menu **2**, no location alerting services will be provided until the alarm is reset by the selection of the "Locn alarm" option of menu **1** and further selections from subsequent displays.

Alert parameters that have been set previously by a commuter in accordance with a regular daily itinerary can be provided continuously. Standard voice, SMS, electronic mail messages, requests for data or requests to cancel data can be stored and then recovered for transmission if the phone enters or leaves a selected location within a predetermined time interval.

Location information may be stored in the subscriber identification module (SIM) card or other memory such as EEPROM within the phone. The selected location information to be stored may be received over-the-air from another mobile station as part of a network service and may take the form of an SMS message. The provision of network services by means of SMS is discussed in US patent 5 794 142 to Vanttila et al.

Claims

1. A communications receiver in which characteristics of radio signals broadcast in selected locations by transmitters of cellular networks are stored and compared with the characteristics of radio signals received in the current location of said receiver and in which an alerting signal is generated in response to a match between said received characteristics in the current location and said stored characteristics of a selected location.

2. A communications receiver in which characteristics of radio signals broadcast in selected locations by transmitters of cellular networks are stored and compared with matching characteristics of radio signals received in the current location of said receiver and in which an alerting signal is generated when said received characteristics in the current location no longer match said stored characteristics of a selected location.

3. A communications receiver as in claim 1 and 2 in which the receiver is part of a mobile phone.

4. A communications receiver as in claims 1 to 3 in which characteristics of radio signals received at a current location are stored as characteristics of a selected location.

5. A communications receiver as in claim 3 in which the characteristics of signals stored by the receiver are mobile phone network location area identities.

6. A communications receiver as in claim 3 in which the characteristics of signals stored by the receiver are mobile phone local dialing codes.

7. A communications receiver as in any preceding claim in which characteristics of radio signals stored as selected locations are received in SMS messages.

8. A communications receiver as in any preceding claim in which said alerting signal initiates transmission of an SMS message.

9. A communications receiver as in any preceding claim in which said alerting signal initiates transmission of a stored voice message.

10. A communications receiver as in any preceding claim in which said alerting signal initiates a request for data to be pulled from an open network.

11. A communications receiver as in any preceding claim in which said alerting signal initiates a request for data to be pushed from an open network.

12. A communications receiver as in any preceding claim in which said alerting signal initiates transmission of an electronic mail.

13. A communications receiver as in any preceding claim in which said alerting signal initiates a request to an open network for cancellation or withholding of pushed data.

Application No:	GB 9915796.8	Examiner:	M J Billing
Claims searched:	1 to 13	Date of search:	30 November 1999

Patents Act 1977
Search Report under Section 17

Databases searched:

UK Patent Office collections, including GB, EP, WO & US patent specifications, in:

    UK Cl (Ed.Q): H4L LDGX, LDPP, LDSL, LECX.

      Int Cl (Ed.6): H04Q 7/22, 7/32, 7/38.

Other: ONLINE - EPODOC, WPI.

Documents considered to be relevant:

Category	Identity of document and relevant passage		Relevant to claims
X	GB2335577A	(ERICSSON) - Figs.4-6, page 12 line 24 to page 14 line 13	1 at least
X	GB2325592A	(NEC) - Fig.5, Abstract	1,2 at least
X	GB2308953A	(SAMSUNG) - Fig.5, Abstract	1 at least
X	GB2267795A	(NEC) - Page 5 line 11 to page 11 line 13	1 at least
X	EP0731621A2	(IBM) - Fig.2, abstract	1 at least
X	JP110155176	(BANDAI) - & WPI Abstract Accession No.1999-391735 [33]	1 at least
X	JP110014731	(NEC) - & WPI Abstract Accession No.1999-157504 [14]	1 at least

X	Document indicating lack of novelty or inventive step	A	Document indicating technological background and/or state of the art.
Y	Document indicating lack of inventive step if combined with one or more other documents of same category.	P	Document published on or after the declared priority date but before the filing date of this invention.
&	Member of the same patent family	E	Patent document published on or after, but with priority date earlier than, the filing date of this application.